

Educational Technology in Vocational Training of Emergency Services

ORIGINAL

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Abstract

Background: The speed of the technological progress influences the health education, to the extent that the progress of knowledge requires innovative teaching methodologies that. Among the various components of the health system in the world, emergency services were considered as priorities in the qualification process of human resources.

Objective: Identify the educational technologies used in the training of professionals who work in emergency services through an integrative review.

Method: Through controlled descriptors of Medical Subject Heading: "Medical education", "Training" and "Emergency" in the databases. 2531 have been included articles in which, 21 were included in the final sample and suffered classification of the level of evidence.

Results: There was a prevalence studies with a level III (71.4%) and in relation to the technology used, 95.2% of the studies used the simulation classified as soft-hard technology. In articles the subjects who used the technologies were the contents of obstetric emergencies and cardiopulmonary resuscitation.

Conclusion: International articles relating to vocational training in emergency feature, mostly considerable level of evidence (III). Among the educational technologies, the simulation was the predominant use of methodology for training nursing staff and doctors.

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Keywords

Health Technology; Simulation; Training of Human Resources in Health.

Introduction

The speed of the technological progress influences the health education, to the extent that the progress of knowledge requires innovative teaching methodologies that, when applied, it enables greater flexibility, dynamics, interaction and communication in the training process. [1]

Among the various components of the health system in the world, emergency services were considered as priorities in the qualification process or human resources, being recognized as a major source of complaints related population to adverse events. [2-4]

Also, the classic report *To err is human* of the Institute of Medicine, brings these services to the area of the greatest possibility of adverse events, which is a great risk associated with the multi-professional practice. [5] Therefore, from this report, it is understood that the error in health, in general, is not only medical and often has many causes. Thus, strategic, educational and operating policies of health and labor organizations can have a positive or negative impact on the occurrence of the error.

Patient safety is something increasingly valued, relevant and current, because it is estimated that between 10% and 20% of patients suffer an adverse event and a significant number of people die due to error, of which about half would be preventable. [6]

The technologies of communication and information drive transformations increasingly in various areas of knowledge [7]. New technologies arise every day, and health professionals need to understand and dominate them to allow safe and quality care. [8]

Thus, the literature [9] brings technologies in healthcare grouped into three categories: light (based on communication and the link relationships according to the needs of health and care); soft-hard (relating two fields that are medical and epidemiological clinic); hard (material as permanent or consumption equipment and furniture).

In this context, though, the medical and nursing staff were undergone during their professional training to educational processes essentially based on the transmission and reproduction of information, not the reflective construction of knowledge, being necessary to integrate pedagogical approaches that include soft and soft-hard technologies that attempt to develop the professional intellectual potential, analytical skills, judgment and critical assessment, the ability to solve problems, critical thinking, creative and inquisitive approach. [10-12]

It should also consider that in Brazil, public and private universities offer insufficient training for dealing with situations of emergency, with lack of subjects and specific internships, often restricted to technical visits and approaches in mini-courses, conferences, graduation or extra-curricular courses. [13]

Thus, education of health workers in an emergency is an area that requires a commitment to the improvement of educational technologies that achieve the multidisciplinary team effectively. It is necessary to create educational strategies that encourage the participation of workers and enable professional training to promote the development of the work process. [12]

Given the above, the question is: what are the educational technologies used in the training of professionals who work in emergency services? Thus, this study aims to identify the educational technologies used in the training of professionals who work in emergency services through an integrative review.

Material and Method

It is an integrative review of the literature, aimed at providing a knowledge synthesis, building an analysis of the literature and results in practice based on scientific knowledge. [14]

For the construction of this study, the following steps were used: theme identification and preparation of the research question; establishment of

inclusion and exclusion criteria of the studies; identification of data to be obtained from the selected studies; categorization of studies, analysis and interpretation of results and presentation of the review and display the summary information. [15]

As a strategy to conduct this review, the following research question was formulated: what are the educational technologies used in the training of professionals who work in emergency services?

The search strategy step occurred in November 2015 in the databases Latin American and Caribbean Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Nursing Database (BDENF), PubMed Central, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science and Scopus (SCOPUS).

To survey of the publications, the controlled descriptors of the Medical Subject Headings (MESH) were used: "Medical education", "Training" and "Emergency", researched jointly by the Boolean AND operator. All the survey steps and selection of articles was performed individually by two researchers and after meeting consensus, the inclusion of the articles occurred.

Articles that meet the following criteria were included: publications between 2010-2015; in English, Portuguese and Spanish, available in full and for free in databases, and having educational technologies used for the training of professionals who work in emergency services. Studies in editorial format, letter to the editor and reviews were excluded. Restriction of the publication period was as a result of the search for technologies that are currently being used, developed and/or improved, applied to the training process.

Table 1 shows the steps performed for the filtering databases. Out of six analyzed databases, only LILACS and BDENF did not add results to the final sample.

After the search procedure, the publications were pre-selected based on reading the title and abstract

Table 1. Quantitative presentation of the localized (L), relevant and read in full (R) and selected (S) articles. Natal, RN, Brazil, in 2015.

Crossing Medical Education and Training and Emergency			
Database	Located	Relevants	Selected
LILACS	17	2	0
MEDLINE	442	12	2
BDENF	2	0	0
CINAHL	143	8	3
SCOPUS	1831	48	14
Web Of Science	96	17	2
Total	2531	87	21

of the localized articles (L). After reading in full the previously selected publications (R), the final sample (S) was defined (n=21).

Then, the articles were categorized and analyzed in Microsoft Excel®, as identification of the article (title, authors, databases, place and year of publication), Article methodology (purpose and type of study) as well as the level of evidence. The results were presented in a table.

In this review, an evidence rating system was employed: Level I - evidence from systematic reviews or meta-analysis of relevant clinical trials; Level II - evidence derived from at least one randomized controlled clinical trial clearly delineated; Level III - well-designed clinical trials without randomization; Level IV - cohort and control case studies well-designed; Level V - systematic review of descriptive and qualitative studies; Level VI - evidence derived from a single descriptive study or qualitative and VII level - opinion of authorities or expert committee report [16].

Results

It was found that 21 (100%) of the references are of international origin with a predominance of the US, which demonstrates the lack and the need for research with this purpose in Brazil (**Table 2**).

Table 2. Presentation of the articles' characteristics, including the year of publication, methodological design and classification of the level of evidence. Natal, RN, Brazil, in 2015.

Year Of Publication	Type Of Study	Country	Level Of Evidence
2015 [17]	Cross-sectional	Noruega	IV
2015 [18]	Control case	Estados Unidos	III
2015 [19]	Almost experimental	Estados Unidos	III
2015 [20]	Randomized	Estados Unidos	III
2013 [21]	Almost experimental	Reino Unido	III
2012 [22]	Descriptive	Inglaterra	IV
2011 [23]	Observational	Estados Unidos	IV
2014 [24]	Almost experimental	Canadá	III
2014 [25]	Study case	Alemanha	V
2014 [26]	Multi-method	Austrália	IV
2015 [27]	Almost experimental	Nova Zelândia	III
2014 [28]		Austria	III

Year Of Publication	Type Of Study	Country	Level Of Evidence
2014 [29]	Almost experimental	Suíça	III
2014 [30]	Almost experimental	Estados Unidos	III
2015 [31]	Control case	Finlândia	V
2015 [32]	Almost experimental	Croácia	III
2016 [33]	Randomized Trial	Dinamarca	III
2011 [34]	Control case	Austrália	III
2014 [35]	Control case	Estados Unidos	III
2015 [36]	Almost experimental	Estados Unidos	III
2015 [37]	Almost experimental	Estados Unidos	III

Table 3 shows the distribution of our final sample of the studies and related technologies discussed, as well as their classification within the category of technologies according to the reference. [9]

Table 3. Distribution of the educational technologies used in this study and the corresponding category of classification technology. Natal, RN, Brazil, in 2015.

Technology	Studies	Professional Category	Theme Approached	Technologic Category
Simulation	22	Maternity Staff	Emergency Obstetric	Soft-Hard
Didactic course	23	Paramedics	Medical Emergency Services	Soft-Hard
E-learning and Simulation	34	Emergency Doctors And Nurses	Cardiopulmonary Resuscitation In Children	Hard And Soft-Hard
Simulation	21	Doctors And Midwives	Emergency Obstetric	Soft-Hard
Simulation - OSCE	25	Emergency Paramedics And Technicians	Trauma	Soft-Hard
Simulation in situ and off-site	33	Midwives, Specialized Midwives, Nurses Assistants, Multiprofessional Nurses	Obstetrics And Anesthesiology	Soft-Hard
Simulation	36	Obstetricians And Neonatal Care Providers	Obstetrics And Neonatology	Soft-Hard
Simulation	17	Air Emergency Medical Service Crew	Medical Emergency Services	Soft-Hard
Simulation - Debriefing assisted video – teaching video of self-guided learning	18	Rescuers	Trauma	Soft-Hard
Simulation	19	Medical Residents	Medical Emergency Services	Soft-Hard
Simulation - Debriefing	20	Health Professionals	Cardiopulmonary Resuscitation	Soft-Hard
Simulation - Debriefing	24	Medical	Medical Emergency Services	Soft-Hard
Simulation	27	Medical	Pediatric Emergency	Soft-Hard

Technology	Studies	Professional Category	Theme Approached	Technologic Category
Simulation – corpse model	26	Paramedics	Medical Emergency Services	Soft-Hard
Simulation	28	Medical	Medical Emergency Services	Soft-Hard
Simulation	29	Multiprofessional	Medical Emergency Services	Soft-Hard
Simulation	30	Medical Anesthesiologist Obstetricians	Emergency Obstetric	Soft-Hard
Simulation	37	Medical	Trauma	Soft-Hard
Simulation	31	Pediatric, Anesthesiologist, Obstetricians, Nurses And Midwives Neonatal	Neonatal Resuscitation	Soft-Hard
Simulation	32	Médicos	Trauma	Soft-Hard
Simulation	35	Multiprofessional	Emergency Obstetric And Neonatal	Soft-Hard

Discussion

The prevalence of studies with the level of evidence III [16], referring to case-control studies and almost experimental was found in this study, demonstrating the need to conduct studies with the highest level of evidence to support a grounding of health professionals and improve their practice. Moreover, the results show a deficiency in Brazilian publications on the topic covered in the research.

In the scenario of educational innovations, the simulation has been set up as a technological and didactic device widely used in the health professionals' training [38]. In this view, the simulation-based training is discussed as an alternative and effective way to use the knowledge and skills, as well as for the establishment of a secure learning environment. [28]

In the education of health professionals, simulation-based training is an alternative and effective way to use the knowledge and skills as well as to establish a safe learning environment. [28]

This methodology allows not only based training lectures, opportunity to practice technical skills in practice stations, as well as have the opportunity to work the "soft skills," but that is also developing specific group soft skills as the active and passive communication. [39]

In England, the National Health Service (NHS) makes annual assessments of competence for maternity teams as a mandatory requirement for medical malpractice liability scheme standards (CNST) of risk management. [21] By 2009, the CNST determined that all maternity staff should receive annual training in obstetric emergencies, [21] which can be proven by the fact that five of the revised articles [21; 22; 30; 33; 36], addressing the emergency obstetric was the training of professionals in the service. Also, the need for research on the impact of these methodologies in real mother simulation to reduce measures of peri-natal morbidity and mortality. [36]

In this perspective, in the United Kingdom [21], Mexico [35], and northern Guatemala San Marcos, Alta Verapaz, Quiche, and Huehuetenango [36], in Minas Gerais, there was a concern and investment to reduce morbidity and maternal and neonatal mortality. Thus, a training of health professionals who work directly and indirectly in this assistance was offered by the State Government. [39]

There are several ways to use simulation-based education (SBE). This range of possibilities in medicine and especially in the Medical Emergency Department and Intensive Care Medicine is becoming a reality in Brazil, as its incorporation since 2009 in the selection of candidates for the title of Specialist Association Brazilian Intensive Medicine (AMIB) [40]

The results of this study showed only one of the references making up the results, using of simulation in conjunction with E-learning. Research conducted in Australia says that this teaching model is to improve both the knowledge and the competence of doctors and nurses in providing cardiopulmonary resuscitation for children in the simulation environment. [34]

The study at the Children's Hospital of Westmead points out that this E-learning with simulation modular proposal for cardiopulmonary resuscitation in children led to an improvement in the ability of participants to perform advanced life support (ALS) by 57% compared to the basic life support (51%) (BLS), resulting in an overall competence of 89% (BLS) and 65% (ALS). [34]

Justifying its predominance in studies as the most used technology, simulation provides a controlled situation of practical experience, which can be used and expanded as a teaching tool when performed with the Debriefing based on individual active reflection and/or the team involved, a way to connect the experience within the simulation and examine constructively the context and the actions taken within it. [40] This strategy is used in studies to aid workers, medical residents as well as multi-professional. [18, 19, 29, 33, 35]

The training tool for paramedics was made upon the concepts of procedures and team communication in compliance with pre-hospital trauma, composing one study of our results²⁵. The study results also brought the simulation [33] as a way to the training of these professionals. In this perspective, the Clinical Examination and Objective Structured (CEOS), extended as a realistic simulation strategy, is an innovative method for evaluating clinical skills of professionals, including effective communication and examination skills, and factual memorization. Unlike a meeting with the real patient, one CEOS occurred in a lower risk setting and allowed participants to become comfortable with history taking, examination, and interpersonal communication. [41]

However, a research [40] opposes the discussions, saying that, at best, the performance evaluation is so good at predicting actual performance as a multiple choice test based on relevant knowledge, but not better. This goes against also to all contributing authors in the study who claim that the methodologies used in education and professional training, as the CEOS (realistic simulation) are not the best choice when compared with the traditional method. Even, it is an intensive resource, it has become a standard practice in the modern assessment of clinical competence, and the results are used in high-level decisions. Many details must be analyzed to this results become confident. [41]

However, a systematic review aimed to assess the evidence of the use of high-fidelity in nursing models, compared with other educational technologies being evaluated [12]. Studies with experimental research design and almost experimental showed that the available evidence supports the notion that the simulation of medium and/or high fidelity is an effective teaching and learning strategy, which also provides additional gains in knowledge, critical thinking ability, satisfaction and trust. [42]

Regarding the teams that are trained, there is a clear predominance of the medical and nursing staff, which can be explained by the case teams directly related to patient care, and the use of simulation technique enables the development of teamwork and error correction without generating effects in patients. [3]

Thus, the studies are following an international recommendation to empower teams with use of realistic simulation, because it is a possible tool to minimize iatrogenic committed by health professionals to patients. [5]

By analyzing the technologies used in the studies, it is clear that there was a predominance of soft-hard technology. Thus, it is known that the control of technology by professionals ensures their use safely and effectively, minimizing the stress for those

who use or operate, allowing a more humanized care about the technicalities practice, emphasizing the need for technical training and scientific professionals. Thus, it is the care that indicates the use of a particular type of technology, and what makes the difference is our intention in the way we apply the care.

Conclusion

This study concludes that the articles published internationally on technologies in training for professionals who work in an emergency, predominantly present a considerable level of evidence (III), being mostly almost experimental and control case studies.

Regarding the educational technologies, simulation is the most discussed methodology in studies and is used mostly for the training of medical and nursing staff, together or separately, with the obstetric emergencies as the theme more worked followed by the cardiopulmonary resuscitation.

As the technology category, all studies used lightweight technologies in its methods, which reveals that those responsible for the studies chosen methods that can reconcile the knowledge of responsible and rational way, developing a critical and reflexive sense of their actions.

The study provides a critical and reflective evaluation of the technologies used in the training of emergency workers and concludes that although being insipient, they are following an international recommendation to enable teams using realistic simulation because it is a possible tool to minimize iatrogenic committed by health professionals to patients by allowing the practice in simulators dolls, structured scenarios enabling risk management uncertainty to patients.

This training method can be used in the future systematically for permanent training teams, aimed at improving the quality of care and patient safety and the environment.

It should be noted that the simulation is not the solution to the problem, but rather a tool in conjunction with other variables (objective of the simulation, participants' experience, the technology used, team participation and trained facilitators) and may transform the reality of a health system.

From the study, there is the need for investment in experimental research structured in the Brazilian scenario for professionals working in emergency, using this realistic simulation strategy, so that we improve in learning and professional practice, formulation of care protocols tested and early detection techniques and behavioral failures in the teams and can manage the risk of error before it is committed to the patient in the Brazilian scene, with all its limitations the public health service offers.

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